PATENT CLAIMS

1. A method for the bonding of disk-shaped substrates, the substrates comprising an essentially plane disk-shaped first substrate (11a) with a central opening (14a) and with a first bonding surface (12a) and a back surface (13a) opposite the first bonding surface (12a), and an essentially plane disk-shaped second substrate (11b) with a central opening (14b) and with a second bonding surface (12b) to be bonded to the first bonding surface (12a) by a layer of adhesive, the method comprising the following steps:

- providing the first substrate (11a) and the second substrate (11b),
- applying liquid adhesive to the first bonding surface (12a) or the second bonding surface (12b) or both,
- positioning, in a vacuum chamber, the first substrate (11a) and the second substrate (11b) with the second bonding surface (12b) facing the first bonding surface (12a) at a distance,
- elastically deforming the first substrate (11a) in such a way that the first bonding surface (12a) assumes a bent shape and upholding the deformation by mechanical means acting on the first substrate (11a),
- evacuating the vacuum chamber,
- moving the first substrate (11a) and the second substrate (11b) towards each other and establishing a small area of contact where edges of the first bonding surface (12a) and the second bonding surface (12b) touch,
- releasing the first substrate (11a) so as to allow it to assume its unstressed essentially plane configuration in such a way that the area of contact

spreads essentially to the entire first and second bonding surfaces (12a, 12b) and

- raising the pressure in the vacuum chamber to atmospheric pressure.

2. The method according to claim 1, **characterized in that** the first substrate (11a) is deformed in such a way that the first contact surface (12a) assumes a concave or convex shape which is upheld by central mechanical means acting on the first substrate (11a) in the vicinity of the central opening (14a) of the same and circumferential mechanical means acting on the first substrate (11a) at positions offset towards the outer edge of the said first substrate (11a).

3. The method according to claim 2, **characterized in that** the central mechanical means exert on the first substrate (11a) a force directed away from the second substrate (11b) while the circumferential mechanical means exert on the first substrate (11a) a force directed towards the second substrate (11b), upholding a deformation of the first substrate (11a) where the shape of the first contact surface (12a) is concave.

4. The method according to claim 3, **characterized in that** the central mechanical means comprise mechanical stop means acting against the first bonding surface (12a) and the circumferential mechanical means comprise mechanical stop means acting on the back surface (13a) of the first substrate (11a).

5. The method according to claim 3, **characterized in that,** due to the elastic deformation of the first substrate (11a), the area of the first bonding surface (12a)

adjacent the central opening (14a) is offset from a plane intersecting the circumference of the first bonding surface (12a) by between 1mm and 3mm.

6. The method according to claim 3, **characterized in that** the area of contact is a narrow annulus adjacent to the outer edge of the first bonding surface (12a) and the second bonding surface (12b) or a subset thereof.

7. The method of claim 6, **characterized in that** the first substrate (11a) is held in a slightly tilted position with respect to the second substrate (11b) when contact is established, thereby assuring that the area of contact is at first restricted to a predefined sector of the annulus.

8. The method according to claim 1, **characterized in that** the vacuum chamber is evacuated to a pressure of between 0.01mbar and 100mbar, preferably between 0.05mbar and 10mbar and in particular between 0.1mbar and 2mbar.

9. The method according to claim 1, **characterized in that** the liquid adhesive is spread over the first bonding surface (12a), the second bonding surface (12b), or both by spinning the first substrate (11a), the second substrate (11b), or both, respectively.

10. An apparatus for carrying out a method of bonding disk-shaped substrates comprising an essentially plane disk-shaped first substrate (11a) with a central opening (14a) and with a first bonding surface (12a) and a back surface (13a) opposite the first bonding surface (12a), and an essentially plane disk-shaped second substrate

(11b) with a central opening (14b) and with a second bonding surface (12b) to be bonded to the first bonding surface (12a) by a layer of adhesive, the apparatus comprising a vacuum chamber accommodating:

- support means for supporting the first substrate (11a), the support means being suitable as a circumferential mechanical means for acting on the first substrate (11a) at positions offset towards the outer edge of the said substrate from its central opening (14a),
- a holding device for holding the second substrate (11b) in a position opposite the first substrate (11a) with the second bonding surface (12b) facing the first bonding surface (12a),
- a support pin (9) extendable through the central openings (14a, 14b) of the first substrate (11a) and the second substrate (11b), with radially extendable and retractable central mechanical means for acting on the edge of the central opening (14a) of the first substrate (11a) or on the first bonding surface (12a) in the vicinity of the central opening (14a).

11. The apparatus of claim 10, **characterized in that** the vacuum chamber comprises a base plate (1) carrying the support means and the support pin (9) and a cover (3) carrying the holding device.

12. The apparatus of claim 10, **characterized in that** the central mechanical means comprise mechanical stop means for acting against the first bonding surface (12a) and the circumferential mechanical means comprise mechanical stop means for acting on the back surface (13a) of the first substrate (11a).

13. The apparatus of claim 10, **characterized in that** the support means is suitable for holding the first substrate (11a) in a position where the first bonding surface (12a) lies in an essentially horizontal first plane and the holding device is suitable for holding the second substrate (11b) in a position where the second bonding surface (12b) lies in an essentially horizontal second plane above the first plane.

14. The apparatus of claim 13, **characterized in that** the first plane and the second plane are parallel.

15. The apparatus of claim 13, **characterized in that** the first plane is slightly tilted with respect to the second plane.

16. The apparatus of claim 15, **characterized in that** the angle between the first plane and the second plane is between 1° and 3°.

17. The apparatus of claim 10, **characterized in that** the holding device is a suction holding device.

18. The method of claim 7, **characterized in that** the angle between the plane of the first substrate and the plane of the second substrate is at least 1° and not greater than 3°.